Executive Summary

ES.1 Background

The Joint Methodology to Assess Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Architecture (JMACA) Joint Test & Evaluation (JT&E) tests, evaluates, and enhances the JMACA Methodology (JM). The JM consists of a set of analytical tools and procedures designed to rapidly identify deficiencies in C4ISR architectures and identify appropriate solutions. The JT&E specifically focuses on the Commander Joint Task Force's (CJTF) need to rapidly assess the interoperability of an integrated Joint C4ISR architecture prior to employment. Implementation of the JM prior to employment contributes to C4ISR systems interoperability before forces arrive in theater, thereby enhancing the Commander's ability to conduct rapid and decisive operations. Although the JT&E is focused at the JTF level, the JM can also be applied to the Combatant Commander's theater, Component Command, Service, and to Coalition Force architectures.

The JMACA JT&E validates the JM through a risk mitigation demonstration of Data Mining; participation in a Mini-Test involving a walkthrough of the JM process; dedicated test of a previous real world architecture; and participation in two JTF-level operational training exercises. The Data Mining Risk Reduction Event was completed in August 2002 and the Mini-Test was completed in December 2002. The first Validation Test (VT-1) was originally scheduled for the Joint Task Force Exercise (JTFEX) 03-3 in September 2003; but, due to operational commitments and world events, VT-1 will be completed using real world operational architecture(s) from Operation Iraqi Freedom (OIF) and using End-to-End Testing in a testbed environment at Joint Interoperability Test Command (JITC).

The JM is a series of steps based on a logical sequence of inputs and outputs allowing the user of the JM to obtain a broad assessment of the C4ISR architecture and to pursue more in-depth analysis as time permits. The JM utilizes software tools to determine high risk areas in components of Joint C4ISR architectures.

The JM toolset utilizes specific C4ISR architecture data as input parameters and then processes the data to determine the high risk and mission critical areas in the C4ISR architectures (depicted by the shaded area in the center of Figure ES-1). JM flexibility enables solutions to deficiencies to be investigated at any point the user deems appropriate. For example, after identifying prioritized risk assessment areas, users can conduct Fine-Grain Analysis (Step 3), End-to-End Testing (Step 4), or Operational Analysis (Step 5), depending on time and resources available for investigation. Recommended enhancements to the architecture are passed to the operational commander for review and implementation. If changes to the architecture are approved, the JM can be used to provide similar re-assessment of the revised architecture. Figure ES-1 illustrates the steps of the JM.

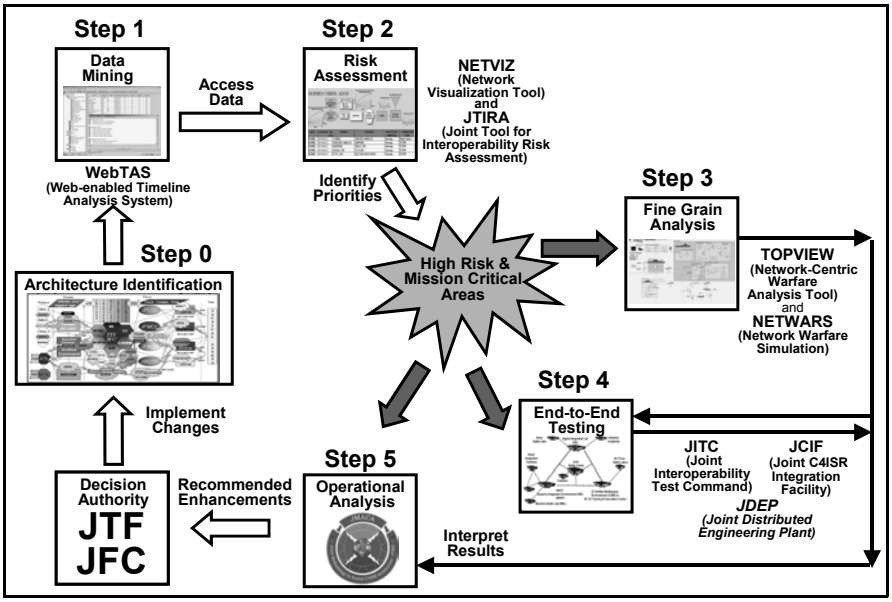

Figure ES-1 JMACA Methodology (JM) Step-by-Step

ES.2 Description of Joint Test Problem and Test Issues

The JMACA JT&E problem statement, which was developed and refined through meetings with the JMACA JT&E Operational Advisory Group (OAG), the JT&E Senior Steering Committee, and Regional Combatant Commanders (RCC) states:

> ***The Joint Task Force Commander has insufficient means to rapidly identify deficiencies and solutions within the C4ISR architecture.***

Additional research revealed:

- Information superiority plays a prominent role in future military operations
- The ability to rapidly assess and improve C4ISR architectures prior to employment would increase the information superiority of the warfighter
- The ability to assess C4ISR architectures cannot currently be met with existing resources due to time, accuracy, or completeness constraints
- The dynamic state of world events continues to necessitate rapid responses, Joint operations, and the compilation of complicated and innovative C4ISR architectures that may not follow traditional doctrine
- The ability to assess C4ISR architectures prior to employment is likely to become increasingly important due to an escalating infusion of complex new systems, software, and processes

The primary issues that the JMACA JT&E addresses are:

ISSUE 1: How well does the JM support the assessment of the JTF C4ISR architecture?

ISSUE 2: How suitable is the JM for use by the CJTF during the C4ISR architecture development process?

ES.3 Overview of JMACA Validation Test 1

The VT-1 test concept is depicted in Figure ES-2. The operational architecture is assessed using the JM. The output of the JM provides a number of equipment strings related to the Time Sensitive Targeting (TST) and Close Air Support (CAS) mission areas that are resident in the operational architecture. The JMACA test

team will observe and collect data concerning the JM-identified equipment strings, as well as data concerning any failures or problems with the operational architecture. Additionally, a number of JM-identified equipment strings will be tested at the Joint Interoperability Test Command (JITC). A series of interoperability test trials will be conducted to determine any interoperability issues of the JM-identified equipment strings. Analysis and comparison of the JM-identified equipment strings with the actual deficient equipment strings of the operational architecture, along with the data collected during testbed operations will be accomplished during post-test analysis.

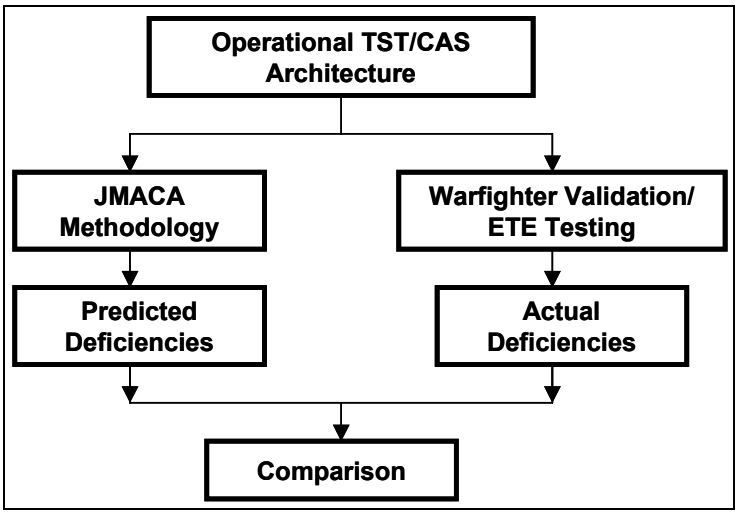

Figure ES-2 Overview of VT-1 Test Concept

ES.3.1 Description of VT-1

- JM Toolset Assessment. Potential operational users of the JMACA test products will execute all steps of the JM. Users include personnel from Joint Forces Command (JFCOM); Air Force Command and Control, Intelligence, Surveillance, and Reconnaissance Center (AFC2ISRC); Marine Joint Concept Design and Evaluation (JCDE) Office, Training and Doctrine Command (TRADOC); and personnel involved in architecture development for operational exercises to include personnel from JITC and JFCOM. Logs, surveys, and JM tool outputs will be collected to verify JM user procedures, verify that the output of each tool feeds the input of the tool in the next step, and assess the suitability of each tool.
- Testbed End-to-End Testing. Equipment strings identified by the JM during the JM toolset assessment phase of the test will be setup and tested in a testbed environment at JITC. A series of interoperability tests will be conducted on the equipment strings that will be documented in the test scripts. VT-1 testing will be conducted in the same manner to the tests that JITC uses during interoperability certification.
- Operational Architecture Assessment. The JMACA test team will collect data associated with the operation of the operational architecture. Logs, surveys, message data, and lessons learned will be collected to capture the deficiencies and/or interoperability issues of the operational architecture.

ES.3.2 Test Schedule

There are two distinct phases of VT-1. The first phase is the execution of the JM to assess the risk level of equipment strings in the operational architecture and to assess the capability of the software tools used in

this process. The second phase is the testbed End-to-End Testing phase. The VT-1 schedule is shown in Table ES-1.

Table ES-1 Validation Test 1 Schedule

Event	Dates
JM Toolset Assessment	18-27 August 2003
Testbed End-to-End Testing	15-26 September 2003

ES.3.3 Test Constraints and Limitations

The VT-1 architecture is a real world operational architecture, an architecture developed and executed in an actual military operation. The JMACA test team did not directly observe the deficiencies or interoperability issues associated with that architecture during execution. The team will rely on published lessons learned and interviews with Subject Matter Experts (SMEs) from the operational theater, along with testbed End-to-End Testing, to capture the actual deficiencies and interoperability issues associated with the architecture.

Testbed End-to-End Testing will be accomplished at JITC. One of the primary missions of JITC is to provide support to the operational community. In the event that a hotline call is received, or an operational commander requires on-site technical assistance, the End-to-End Testing will be delayed until JITC is available to provide the required End-to-End Testing support. The VT-1 schedule is flexible to accommodate JTIC real world mission support.

ES.4 Expected Test Products

- JT&E Reports. A Quick Look Report will be published within seven days after completion of VT-1. A test report will be published within 120 days after completion of VT-1.
- JM Toolset Enhancement Recommendations. Suggested improvements to the JM toolset will be forwarded to the toolset custodians for implementation.
- Lessons Learned. The JMACA test team will compile lessons learned from the VT-1 Test event regarding test execution, data collection, and analysis. These lessons learned will be incorporated into the planning for VT-2.
- Results of the JM toolset assessment may recommend individual software tools be released to organizations requiring similar functionality that the specific JM software tool provides.
- VT-1 will provide an assessment of the single testbed approach for conducting End-to-End Testing, Step 4 of the JM.